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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,738	07/23/2002	Francis Humblot	33808F172	4589

441 7590 02/05/2007  
SMITH, GAMBRELL & RUSSELL  
1850 M STREET, N.W., SUITE 800  
WASHINGTON, DC 20036

EXAMINER
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SINGH, PREM C

ART UNIT	PAPER NUMBER
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1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/05/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/088,738	HUMBLOT ET AL.	
	Examiner	Art Unit	
	Prem C. Singh	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/04/2006 has been entered.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 recites the limitation "pressure" in claim 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. Claims 1-6, 9-14, and 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann et al (US Patent 5,849,176).

7. With respect to claim 1, Zimmermann discloses, "A process for producing thermally cracked products from hydrocarbons while simultaneously reducing the coke deposits on the heat exchange surfaces consists in adding to the feed to be cracked a mixture of volatile organic compounds containing silicon and volatile organic compounds containing sulfur." (Column 2, lines 27-37). "The temperature used is between 700 to 1000°C when the heat exchange surface is metal inner wall of a tubular reactor. The temperature is 400 to 750°C when the heat exchange surface is the metal surface of a heat exchanger, for example, which is connected downstream to the tubular reactor." (Column 2, lines 57-62). "The compound containing silicon and/or sulfur is preferably selected from the group that consists of dimethyl sulfide, tetramethyl silane, and their mixtures. However, other volatile compounds can also be used." (Column 2, lines 65-67; column 3, lines 1-3). "N-heptane was subjected to pyrolysis under normal pressure in steam as the diluent." (Column 4, lines 47-49). Zimmermann further discloses in Table 2 (Column 8, lines 5-14) the test time from 0.5 hr to 12 hr for treating a surface with tri-methyl-silyl-methyl-mercaptan during pyrolysis of n-heptane in presence of steam.

It is to be noted that the results in Table 2 use a composition simultaneously containing silicon and sulfur both. But the invention adds, "These rates indicate that in place of compounds that simultaneously contain both silicon and sulfur, mixtures of

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silicon compounds and sulfur compounds also attain the same effect as coke formation inhibitors." (Column 6, lines 52-56).

Although Zimmermann uses a temperature range of 700 to 1000°C, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use a temperature in the range of 300-1100°C to cover a wider range and make the process more flexible. One skilled in the art would use any temperature, including in the claimed range, for an effective coke inhibition process.

8. Claims 2-4 have all the limitations of claim 1 and discussed before.

9. With respect to claim 5, Zimmermann discloses, "Figures 1-7 show in respect to pre-activated samples of chrome-nickel steel and samples that display a reduced coking tendency due to special thermal pre-treatment with compounds containing silicon and sulfur, the dependency of coke formation rates on test time during the pyrolysis of n-heptane in nitrogen and in steam as the diluent when known coke formation inhibitors and inhibitors according to the invention are added." (Column 3, lines 54-63).

Although Zimmermann uses nitrogen and steam as diluent separately, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use a mixture of steam and nitrogen as diluent because the mixture is also expected to be effective for coke inhibition due to the fact that the use of steam and nitrogen individually, is effective. See *In Re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

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10. Claim 6 has all the limitations of claim 1 and discussed before.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann et al (US Patent 5,849,176) in view of Reed et al (US Patent 5,656,150).

With respect to claim 7, Zimmermann does not specifically mention using hexamethyldisiloxane, but the invention does disclose, "Other volatile compounds can also be used, insofar as the object of the present invention is achieved." (Column 3, lines 1-3).

Reed discloses a novel method for treating the radiant tubes of a fired pyrolysis heater with an antifoulant composition for inhibiting coke deposition. Reed uses several silicon compounds including hexamethyldisiloxane (See column 4, lines 32-62).

Since Zimmermann and Reed both inventions disclose coke inhibition on the inner tubes of a cracking reactor by using silicon compounds, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use hexamethyldisiloxane for coke inhibition as disclosed by Reed because this composition is also effective as other compositions disclosed by Zimmermann. See *In Re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958) and *In Re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

12. With respect to claim 9, Zimmermann discloses using di-methyl-di-sulfide (See column 4, lines 3-7).

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13. With respect to claim 10, Zimmermann discloses, "In all cases the atomic ratio of silicon and sulfur is between 5:1 to 1:1". (Column 2, lines 48-49).

14. With respect to claim 11, Zimmermann discloses using 20 to 1000 ppm of the additive composition (See column 2, lines 29-31).

15. With respect to claims 12 and 21, Zimmermann discloses using normal pressure (1 atm pressure = 1.013 bar) (See column 4, lines 47-48).

16. With respect to claims 13 and 14, Zimmermann discloses, "On a pre-activated sample of chrome nickel steel dependence of coke formation rate on the test time during n-heptane pyrolysis without and with the addition of 85 ppm dimethyl disulfide is shown in figure 2." (Column 4, lines 3-7).

17. With respect to claim 15, Zimmermann does not disclose using hexamethyldisiloxane.

Reed discloses using hexamethyldisiloxane as an inhibiting composition being added to the hydrocarbon feed after the pre-treatment (See column 6, lines 5-64).

As discussed under claim 7, it would have been obvious to one skilled in the art at the time the invention was made to modify Zimmermann invention and use hexamethyldisiloxane as suggested by Reed on a pre-treated sample for coke inhibition



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because any silicon and/or sulfur compound disclosed by Zimmermann and Reed is expected to be effective.

18. Claims 16-20 and 22-24 have all the limitations of claims 10 and 11, and discussed before.

### ***Response to Arguments***

19. It is to be noted that the new rejection presented in the Office action above is based on only one reference (Zimmermann, '176). Claims 7 and 15 are rejected over Zimmermann, '176) in view of Reed, '150.

20. The Applicant argues on the use of steam as provided in the previous Office action.

Zimmermann, '176 uses steam as a carrier gas.

21. Applicant's arguments based on references: Zimmermann, '192 and Kukes, '418 are moot because they have not been used in the new Office action.

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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